

## CLAIMS

WHAT IS CLAIMED IS:

- See 7
- 1 1. A method of generating a first tagged machine pointer to a first object referenced  
 2 by a second object, said method comprising the computer-implemented steps of:  
 3 fetching a tagged numeric reference stored within the second object based on a  
 4 second tagged machine pointer that points to the second object; and  
 5 generating the first tagged machine pointer as a sum including the tagged numeric  
 6 value and the second tagged machine pointer.
  - 1 2. The method of claim 1, wherein the sum further includes a predetermined  
 2 constant.
  - 1 3. The method of claim 1, wherein the step of fetching a tagged numeric reference  
 2 includes fetching the tagged numeric reference that includes a tag portion that indicates  
 3 whether the first object and the second object have a same or a different contiguity.
  - 1 4. The method of claim 3, wherein:  
 2 the tag portion includes bits of the first tagged numeric reference that are less  
 3 significant than bits used for an offset portion; and  
 4 the tag portion contains one of at least a first tag value indicating that the first object  
 5 is contiguous and a second value indicating that the second object is non-  
 6 contiguous, wherein a difference of the first value and the second value is  
 7 congruent to  $2^{N-1}$  modulo  $2^N$ .

1 8. A method of managing memory, comprising the computer-implemented steps of:  
2 storing a plurality of objects in a memory; and  
3 storing references between the objects in the memory as self-relative numeric  
4 references.

1 9. The method of claim 8, further comprising the step of calculating a pointer  
2 difference between a first machine pointer to a first object and a second machine pointer  
3 to a second object to produce a self-relative numeric reference.

1 10. The method of claim 8, wherein the step of calculating a pointer difference  
2 between a first machine pointer to a first object and a second machine pointer to a second  
3 object to produce a self-relative numeric reference includes the step of calculating the  
4 pointer difference between a first tagged machine pointer to the first object and a second  
5 tagged machine pointer to the second object to produce a tagged self-relative numeric  
6 reference.

1 11. The method of claim 10, wherein the pointer difference further includes a  
2 predetermined constant.

1 12. The method of claim 10, wherein a tag portion of the self-relative numeric  
2 reference indicates whether the first object and the second object have a same or different  
3 contiguity.

1 13. The method of claim 12, wherein:  
2 the tag portion includes bits of the tagged self-relative numeric reference that are less  
3 significant than bits used for an offset portion; and

4 the tag portion contains one of at least a first tag value indicating that the first object  
5 is contiguous and a second value indicating that the second object is non-  
6 contiguous, wherein a difference of the first value and the second value is  
7 congruent to  $2^{N-1}$  modulo  $2^N$ .

1 14. A computer-readable medium bearing instructions for generating a first tagged  
2 machine pointer to a first object referenced by a second object, said instructions arranged,  
3 when executed, to cause one or more processors to perform the steps of:  
4 fetching a tagged numeric reference stored within the second object based on a  
5 second tagged machine pointer that points to the second object; and  
6 generating the first tagged machine pointer as a sum including the tagged numeric  
7 value and the second tagged machine pointer.

1 15. The computer-readable medium of claim 14, wherein the sum further includes a  
2 predetermined constant.

1 16. The computer-readable medium of claim 14, wherein the step of fetching a  
2 tagged numeric reference includes fetching the tagged numeric reference that includes a  
3 tag portion that indicates whether the first object and the second object have a same or a  
4 different contiguity.

1 17. The computer-readable medium of claim 16, wherein:  
2 the tag portion includes bits of the first tagged numeric reference that are less  
3 significant than bits used for an offset portion; and  
4 the tag portion contains one of at least a first tag value indicating that the first object  
5 is contiguous and a second value indicating that the second object is non-

6 contiguous, wherein a difference of the first value and the second value is  
7 congruent to  $2^{N-14}$  modulo  $2^N$ .

1 ~~21.~~ A computer-readable medium bearing instructions for managing memory, said  
2 instructions arranged, when executed, to cause one or more processors to perform the  
3 steps of:  
4 storing a plurality of objects in a memory; and  
5 storing references between the objects in the memory as self-relative numeric  
6 references.

1 22. The computer-readable medium of claim 21, said instructions further arranged to  
2 cause said one or more processors to perform the step of calculating a pointer difference  
3 between a first machine pointer to a first object and a second machine pointer to a second  
4 object to produce a self-relative numeric reference.

1 23. The computer-readable medium of claim 21, wherein the step of calculating a  
2 pointer difference between a first machine pointer to a first object and a second machine  
3 pointer to a second object to produce a self-relative numeric reference includes the step of  
4 calculating the pointer difference between a first tagged machine pointer to the first  
5 object and a second tagged machine pointer to the second object to produce a tagged self-  
6 relative numeric reference.

1 24. The computer-readable medium of claim 23, wherein the pointer difference  
2 further includes a predetermined constant.

26. The computer-readable medium of claim 25, wherein:  
the tag portion includes bits of the tagged self-relative numeric reference that are less  
significant than bits used for an offset portion; and  
the tag portion contains one of at least a first tag value indicating that the first object  
is contiguous and a second value indicating that the second object is non-  
contiguous, wherein a difference of the first value and the second value is  
congruent to  $2^{N-14}$  modulo  $2^N$ .

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